STN

* (HCAPLUS, INSPEC, INPADOC, USPATALL, JAPIO)

11/30/04

=> d his

(FILE 'HOME' ENTERED AT 11:26:33 ON 30 NOV 2004)

FILE 'HCAPLUS, BIBLIODATA, JAPIO, USPATFULL, USPAT2' ENTERED AT 11:28:21 ON 30 NOV 2004

FILE 'HCAPLUS, INSPEC, JAPIO, INPADOC, USPATFULL, USPAT2' ENTERED AT 11:28:36 ON 30 NOV 2004

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L1        39718 S (CZ OR CZOCHRALSKI)
L2        21468 S (CZ OR CZOCHRALSKI)(8A)(CRYSTAL?)
L3        19383 S (INTERRUPT? OR INTERCEPT? OR STOP? OR SLOW?)(8A)(WIRE# OR PUL
L4      1084374 S (CONTROLLER)
L5            0 S (VIRBRATION)(8A)(ALTER? OR ADJUST? OR VARY?)
L6         2123 S (STOP? OR INTERRUPT? OR INTERCEPT? OR DAMPEN? OR SLOW?)(8A)(O
L7            0 S L1 AND L2 AND L3 AND L4 AND L5 AND L6
L8            0 S L1 AND L2 AND L3 AND L4 AND L6
L9            0 S L2 AND L3 AND L4 AND L6
L10          42 S L2 AND L3
L11           1 S L2 AND L6
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=> d l10 1-42 abs,bib

L10 ANSWER 1 OF 42 HCAPLUS COPYRIGHT 2004 ACS on STN

AB An apparatus for growing a single **crystal** by a **Czochralski** method comprises a wire having a holder of a seed crystal for pulling and a means of automatically **stopping** the wobbling of the **wire** for safe and efficient growth. A method for growing a single crystal using the above apparatus is also described.

AN 2004:753366 HCAPLUS

DN 141:268945

TI Apparatus and method for growing single **crystal** by **Czochralski** method

IN Urano, Masahiko; Nakamura, Yasushi

PA Shinetsu Handotai Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 10 pp.
CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2004256340	A2	20040916	JP 2003-47523	20030225
PRAI	JP 2003-47523		20030225		

L10 ANSWER 2 OF 42 HCAPLUS COPYRIGHT 2004 ACS on STN

AB cf. C. A 20, 3419. A review of recent work on the production and properties of large single crystals of metals. The deposition of Zr on a heated W wire from Zr iodide vapor is described, the resulting metal being pure and ductile. Long single **crystals** were produced by **Czochralski** from molten metal by **slowly** drawing out a **wire** from the melt; and by Bridgman, Elam, etc., by solidifying a tube full of liquid progressively from one end to the other. The transformation of ordinary solid Al and Fe into single crystals by carefully controlled straining and reheating is also described. X-ray analysis has shown that these large single crystals are free from strain, and grow easily in various positions though some orientations are avoided. They are very soft and easily deformed. Single crystals of Al do not yield elastically; they finally slip along 2 planes after a certain amount of distortion, giving a double-wedge fracture. With 18.6% Zn in the Al, the slip is chiefly on one plane, giving an oblique fracture. A single Fe crystal does not slip along a plane very far, but in blocks, so that the

slip lines appear curved. The results of Taylor and Elam on these points are discussed in detail.
AN 1927:4464 HCAPLUS
DN 21:4464
OREF 21:552g-i
TI Methods of growing large metal crystals
AU Carpenter, H. C. H.
SO Metal Ind. (London) (1926), 29, 409-11,437-9
DT Journal
LA Unavailable

L10 ANSWER 3 OF 42 JAPIO (C) 2004 JPO on STN
AN 2001-058897 JAPIO
AB PROBLEM TO BE SOLVED: To provide a single crystal production apparatus capable of improving productivity of single **crystal** production by a **Czochralski** method by equipping a production facility with plural shake stopping pieces which are installed movably in a radial direction at plural positions in the circumferential direction in a chamber, are moved outward so as to pass a pulled crystal inside and forms a circular guide face in which plural retaining wires are inscribed in an inward projected state.
SOLUTION: When rotation and pulling of a retainer 7 are started, a shake stopping means 11 are moved from evacuation positions to inside shake **stopping** positions to form a guide ring. Retaining **wires** 8 are turned around a pulling shaft 5 while being guided on a guide face of the guide ring. Although the retaining wires 8 are liable to readily shake in a process of the progress of retention and pulling of a single crystal 40, the retaining wires do not cause a shake because the retaining wires are restricted from outside on the guide face. When retention and pulling of the single crystal 40 is further advanced and the single crystal 40 is brought close to the shake stopping pieces 11, the shake stopping pieces 11 are moved to the outside evacuation positions and the single crystal 40 is passed inside the shake stopping pieces 11. Consequently the pulling of the single crystal is not damaged.

AN 2001-058897 JAPIO
TI SINGLE CRYSTAL PRODUCTION APPARATUS
IN KUBO TAKAYUKI; AKASHI YOSHIHIRO; KUWABARA MASANORI
PA SUMITOMO METAL IND LTD
PI JP 2001058897 A 20010306 Heisei
AI JP 1999-235737 (JP11235737 Heisei) 19990823
PRAI JP 1999-235737 19990823
SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2001

L10 ANSWER 4 OF 42 JAPIO (C) 2004 JPO on STN
AN 1998-265292 JAPIO
AB PROBLEM TO BE SOLVED: To prevent the arrival of a melt at the outside wall of a heating furnace chamber made of a stainless steel even if this melt leaks out of a quartz crucible by installing a receiving tray consisting of a laminated structure composed of carbon and quartz between the crucible and the floor surface within the hermetically closed system within a **crystal** pulling up device of a **CZ** system.
SOLUTION: This crystal pulling up device has the crucible 3 which holds the liquid level layer of the melt melted by a graphite heater 12 at a supercooled state and a pulling up means (wire 15 and a **wire** take-up means 4) for **slowly** pulling up the single crystal solidified by bringing the single crystal into contact with a seed single crystal 17 while growing the single crystal at the liquid surface layer of the melt and rotating the crystal above the crucible 3 in the system hermetrically sealed in an inert gas atmosphere. The receiving tray 20 consisting of the laminated structure of the carbon and the quartz is installed on the floor surface of the heat shielding cylinder 13 of a heating furnace chamber 1. The receiving tray may be formed of a

three-layered structure composed of a carbon layer, a quartz layer and a carbon layer.
COPYRIGHT: (C)1998,JPO

AN 1998-265292 JAPIO
TI CRYSTAL PULLING UP DEVICE
IN MATSUBARA JUNICHI; TAKASE NOBUMITSU
PA SUPER SILICON KENKYUSHO:KK
PI JP 10265292 A 19981006 Heisei
AI JP 1997-89976 (JP09089976 Heisei) 19970326
PRAI JP 1997-89976 19970326
SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1998

L10 ANSWER 5 OF 42 JAPIO (C) 2004 JPO on STN
AN 1987-119190 JAPIO
AB PURPOSE: To eliminate the effect of oscillation and to control the diameter of a single crystal with high precision by combining the detection of the diameter of the single crystal from photometric data and the detection of the oscillation amount of the single crystal in the production of the single **crystal** by the **Czochralski** method.
CONSTITUTION: The crystal melt 5 in a crucible 2 on a rotary pedestal 3 is kept at an appropriate temperature by a heater 4 in a chamber 1. A seed 7 at the
tip of a wire 6, which is vertically inserted, is dipped in the melt 5, then the **wire** is **slowly** lifted while being rotated in the direction opposite to the rotation of the crucible 2, and a single crystal 8 is grown. In this case, the fusion ring part in the X-X direction of the crystal 8 is photometrically measured by the first CCD camera 9, and the diameter of the crystal 8 is measured from the data. The motion of the crystal 8 in the Y-Y direction is grasped by the second CCD camera, the measured data are sent to an oscillation amount computer 13 through a processor 12, and the oscillation amount of the crystal 8 is calculated. A real diameter is calculated by a diameter correction unit 14 from the calculated oscillation amount and the measured diameter value. The lifting velocity of the crystal 8 is controlled by a controller 15 so that the read diameter coincides with the desired value.
COPYRIGHT: (C)1987,JPO&Japio

AN 1987-119190 JAPIO
TI METHOD AND DEVICE FOR CONTROLLING DIAMETER OF SINGLE CRYSTAL
IN YAMAMURA HARUO; ICHIKAWA HIROSHI
PA KYUSHU DENSHI KINZOKU KK
OSAKA TITANIUM SEIZO KK
PI JP 62119190 A 19870530 Showa
AI JP 1985-255973 (JP60255973 Showa) 19851114
PRAI JP 1985-255973 19851114
SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1987

L10 ANSWER 6 OF 42 USPATFULL on STN
AB A single-crystal structure is grown using free-form fabrication through principles of directional solidification and direct-deposition techniques. The structure is formed from a metallic alloy by building from feedstock on top of and upward from a heated base element. The top of the structure is also heated with a scanning beam as it is built. The higher temperatures near the melting alloy tend to promote crystal growth rather than nucleation as the grain grows toward the heat of the scanning beam. This allows a two-dimensional thermal gradient to be formed in the build direction, which allows the solid crystal to maintain one orientation during the deposition process. As the material initially solidifies, it nucleates off of a desired grain that is designated by a grain selector. This method eliminates the need for expensive mold cavities and segmented furnaces that are typically required by prior art processes for producing some components.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2004:257932 USPATFULL
TI System and method of making single-crystal structures through free-form fabrication techniques
IN Brice, Craig A., Keller, TX, UNITED STATES
PA Lockheed Martin Corporation (U.S. corporation)
PI US 2004200404 A1 20041014
AI US 2003-412379 A1 20030411 (10)
DT Utility
FS APPLICATION
LREP BRACEWELL & PATTERSON, L.L.P., SUITE 2900, 711 LOUISIANA STREET, HOUSTON, TX, 77002-2781
CLMN Number of Claims: 15
ECL Exemplary Claim: 1
DRWN 1 Drawing Page(s)
LN.CNT 354
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 7 OF 42 USPATFULL on STN
AB The apparatus, system and method for cutting crystal ingot provide techniques for cutting an ingot into wafers with a wire cutting apparatus utilizing wire with a diameter of less than 0.18 mm, such as 0.14 mm. The wire cutting apparatus also includes multiple rollers about which the wire is wrapped, and nozzles for applying slurry to the wire. One of the rollers is located on one side of the crystal ingot, while another roller is located on the other side of the crystal ingot. At least one nozzle is disposed proximate the first and second rollers. The nozzles collectively disperse slurry at a rate in the range of 40 to 60 liters per minute, such as 50 liters per minute, and at a viscosity of 42 to 62 centipose, such as 52 centipose.

AN 2004:111219 USPATFULL
TI Apparatus, system and method for cutting a crystal ingot
IN McAulay, Shawn V., Vancouver, WA, UNITED STATES
Takamizawa, Kazuhisa, Vancouver, WA, UNITED STATES
PA SEH AMERICA, INC., Vancouver, WA (U.S. corporation)
PI US 2004084042 A1 20040506
AI US 2002-289003 A1 20021106 (10)
DT Utility
FS APPLICATION
LREP ALSTON & BIRD LLP, BANK OF AMERICA PLAZA, 101 SOUTH TRYON STREET, SUITE 4000, CHARLOTTE, NC, 28280-4000
CLMN Number of Claims: 25
ECL Exemplary Claim: 1
DRWN 2 Drawing Page(s)
LN.CNT 612

L10 ANSWER 8 OF 42 USPATFULL on STN
AB A process for producing silicon which is substantially free of agglomerated intrinsic point defects in an ingot having a vacancy dominated region. An ingot is grown generally in accordance with the Czochralski method. While intrinsic point defects diffuse from or are annihilated within the ingot, at least a portion of the ingot is maintained above a temperature T.sub.A at which intrinsic point defects agglomerate. The achievement of defect free silicon is thus substantially decoupled from process parameters, such as pull rate, and system parameters, such as axial temperature gradient in the ingot.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2004:5552 USPATFULL
TI Process for cooling a silicon ingot having a vacancy dominated region to produce defect free silicon
IN Falster, Robert J., London, UNITED KINGDOM

Korb, Harold W., Town ?amp; Country, MO, UNITED STATES
PA MEMC Electronic Materials, Inc. (non-U.S. corporation)
PI US 2004003770 A1 20040108
AI US 2003-437141 A1 20030513 (10)
RLI Continuation of Ser. No. US 2001-35540, filed on 23 Oct 2001, GRANTED, Pat. No. US 6562123 Continuation of Ser. No. US 1999-344709, filed on 25 Jun 1999, GRANTED, Pat. No. US 6328795
PRAI US 1999-117623P 19990128 (60)
US 1998-104087P 19981014 (60)
US 1998-90723P 19980626 (60)
DT Utility
FS APPLICATION
LREP SENNIGER POWERS LEAVITT AND ROEDEL, ONE METROPOLITAN SQUARE, 16TH FLOOR, ST LOUIS, MO, 63102
CLMN Number of Claims: 11
ECL Exemplary Claim: 1
DRWN 6 Drawing Page(s)
LN.CNT 869
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 9 OF 42 USPATFULL on STN
AB An apparatus and a method that permits a seed crystal to be directed to a precise location of a melt for growing a ribbon-shaped crystal, but after the crystal has commenced growing, the ribbon-shaped crystal is continuously pulled up so as to produce a longitudinally extending crystal using a continuous pulling device. The method for producing a ribbon-shaped crystal includes growing a ribbon-shaped crystal on a seed crystal using a linear pulling device for pulling the seed crystal and a crystal growing at the end of the seed crystal in a vertical direction, and continuing to pull the ribbon-shaped crystal by using a continuous pulling device having a continuous pulling mechanism. The apparatus for continuous production of a ribbon-shaped crystal includes a linear pulling device for linear vertical pulling of a seed crystal and a ribbon-shaped crystal grown on the seed crystal; a continuous pulling device for pulling the crystal continuously by clamping a portion of the ribbon-shaped crystal; a switching device for changing from the linear pulling device to the continuous pulling device after the seed crystal has passed through the continuous pulling device; and a crystal cutting device for severing the seed crystal from the grown ribbon-shaped crystal.

AN 2003:326798 USPATFULL
TI Method for continuously pulling up crystal
IN Fujita, Kentaro, Tokyo, JAPAN
Terao, Kenji, Tokyo, JAPAN
Isozaki, Hideyuki, Tokyo, JAPAN
Satoh, Iwao, Tokyo, JAPAN
PA Ebara Corporation, Tokyo, JAPAN (non-U.S. corporation)
PI US 6663710 B1 20031216
WO 2000066818 20001109
AI US 2001-959530 20011029 (9)
WO 2000-JP2618 20000421
PRAI JP 1999-125064 19990430
DT Utility
FS GRANTED
EXNAM Primary Examiner: Norton, Nadine G.; Assistant Examiner: Song, Matthew
LREP Wenderoth, Lind & Ponack, L.L.P.
CLMN Number of Claims: 11
ECL Exemplary Claim: 1
DRWN 7 Drawing Figure(s); 7 Drawing Page(s)
LN.CNT 362

L10 ANSWER 10 OF 42 USPATFULL on STN

AB In the **CZ** process using a cooling member surrounding a single **crystal**, the cooling member is permitted to effectively serve to increase a pulling speed. Cracks of the single crystal due to excessive cooling are prevented to occur. A high crystal quality is acquired. In order to realize these objects, the temperature of the inner peripheral surface of the cooling member 6 opposing to the outer peripheral surface of the single crystal 4 is restricted to 500° C. or below, even in the lower end, the temperature of which becomes the highest. To achieve this restriction, the thickness T of the cooling member 5 is 10 to 50 mm. The height H of the cooling member 6 is 0.1 to 1.5 times the diameter D of the single crystal 4.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AN 2003:217098 USPATFULL
TI Crystal growth method
IN Kubo, Takayuki, Tokyo, JAPAN
Kawahigashi, Fumio, Tokyo, JAPAN
Asano, Hiroshi, Tokyo, JAPAN
Miki, Shinichiro, Tokyo, JAPAN
Nishimoto, Manabu, Tokyo, JAPAN
PI US 2003150373 A1 20030814
US 6767400 B2 20040727
AI US 2002-130671 A1 20020924 (10)
WO 2001-JP8313 20010925
PRAI JP 2000-292453 20000926
DT Utility
FS APPLICATION
LREP MORRISON & FOERSTER LLP, 1650 TYSONS BOULEVARD, SUITE 300, MCLEAN, VA, 22102
CLMN Number of Claims: 5
ECL Exemplary Claim: 1
DRWN 1 Drawing Page(s)
LN.CNT 409
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 11 OF 42 USPATFULL on STN

AB The present invention provides an apparatus and a method for producing a silicon semiconductor single crystal which can stabilize and homogenize an amount of precipitated oxygen in the direction of the crystal growth axis when growing a silicon semiconductor single crystal. The apparatus for producing a silicon semiconductor single **crystal** by the **Czochralski** method comprises a main growth furnace having a crucible retaining silicon melt disposed therein for growing a silicon semiconductor single crystal, and an upper growth furnace for housing therein and cooling the silicon semiconductor single crystal pulled from the silicon melt, wherein the upper growth furnace communicated to a ceiling section of the main growth furnace is provided with an upper insulating member for surrounding a pulled silicon semiconductor single crystal.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AN 2003:131227 USPATFULL
TI Apparatus and method for producing silicon semiconductor single crystal
IN Hoshi, Ryoji, Nishishirakawa-gun Fukushima, JAPAN
Yanagimachi, Takahiro, Nishishirakawa-gun Fukushima, JAPAN
Fusegawa, Izumi, Nishishirakawa-gun Fukushima, JAPAN
Ohta, Tomohiko, Nishishirakawa-gun Fukushima, JAPAN
Miyahara, Yuuichi, Takefu-shi Fukui, JAPAN
Igarashi, Tetsuya, Takefu-shi Fukui, JAPAN
PI US 2003089300 A1 20030515
US 6764548 B2 20040720
AI US 2002-204278 A1 20020820 (10)
WO 2001-JP9434 20011026

PRAI JP 2000-333747 20001031
DT Utility
FS APPLICATION
LREP Rader Fishman & Grauer, Suite 501, 1233 20th Street NW, Washington, DC, 20036
CLMN Number of Claims: 11
ECL Exemplary Claim: 1
DRWN 6 Drawing Page(s)
LN.CNT 689
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 12 OF 42 USPATFULL on STN
AB A susceptor for use in a **Czochralski crystal** growing apparatus is disclosed wherein erosion of the susceptor is minimized. The susceptor contains ventilation holes that allow process gases found between the susceptor and crucible to escape. The crucible may incorporate the use of a protective coating over part or all of the susceptor, such as a silicon carbide coating. The ventilation holes are placed at various heights along the susceptor wall to allow ventilation near the area of plastic deformation of the crucible.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2003:103719 USPATFULL
TI Vented susceptor
IN Addis, Kennard K., Washougal, WA, UNITED STATES
PI US 2003070612 A1 20030417
AI US 2001-976796 A1 20011012 (9)
DT Utility
FS APPLICATION
LREP Douglas G. Anderson, P.O. Box 8965, Vancouver, WA, 98668-8965
CLMN Number of Claims: 5
ECL Exemplary Claim: 1
DRWN 2 Drawing Page(s)
LN.CNT 251
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 13 OF 42 USPATFULL on STN
AB In a method manufacturing a silicon single crystal 8 according to an MCZ method, a flow rate of an inert gas flowing in a growth furnace 1 during growth of the silicon single crystal 8 and/or a pressure in the growth furnace 1 is altered according to a pulling amount of the silicon single crystal 8 to adjust an interstitial oxygen concentration therein. By altering a flow rate of an inert gas flowing in the growth furnace or a pressure therein, an amount of oxygen evaporating as an oxide from a surface of a silicon melt 10 in the vicinity of a crystal growth interface can be easily adjusted, and thereby, an oxygen amount included in the silicon melt 10 can be controlled with ease.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2002:284779 USPATFULL
TI Method for preparing silicon single crystal and silicon single crystal
IN Fusegawa, Izumi, Fukushima, JAPAN
Hoshi, Ryoji, Fukushima, JAPAN
Inokoshi, Kouichi, Fukushima, JAPAN
Ohta, Tomohiko, Fukushima, JAPAN
PI US 2002157600 A1 20021031
US 6592662 B2 20030715
AI US 2001-959381 A1 20011024 (9)
WO 2001-JP1460 20010227
PRAI JP 2000-52540 20000228
DT Utility
FS APPLICATION
LREP Ronald R Snider, Snider & Associates, PO Box 27613, Washington, DC,

20038-7613
CLMN Number of Claims: 10
ECL Exemplary Claim: 1
DRWN 6 Drawing Page(s)
LN.CNT 878
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 14 OF 42 USPATFULL on STN
AB A method and apparatus for producing silicon single crystals with reduced iron contamination is disclosed. The apparatus contains at least one structural component constructed of a graphite substrate and a silicon carbide protective layer covering the surface of the substrate that is exposed to the atmosphere of the growth chamber. The graphite substrate has a concentration of iron no greater than about 1.5*10.sup.12 atoms/cm.sup.3and the silicon carbide protective layer has a concentration of iron no greater than about 1.0*10.sup.12 atoms/cm.sup.3.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2002:263808 USPATFULL
TI Apparatus and process for the preparation of low-iron single crystal silicon substantially free of agglomerated intrinsic point defects
IN Sreedharamurthy, Hariprasad, Ballwin, MO, UNITED STATES
Banan, Mohsen, Grover, MO, UNITED STATES
Holder, John D., Lake St. Louis, MO, UNITED STATES
PI US 2002144642 A1 20021010
AI US 2001-39459 A1 20011107 (10)
PRAI US 2000-258296P 20001226 (60)
DT Utility
FS APPLICATION
LREP SENNIGER POWERS LEAVITT AND ROEDEL, ONE METROPOLITAN SQUARE, 16TH FLOOR, ST LOUIS, MO, 63102
CLMN Number of Claims: 33
ECL Exemplary Claim: 1
DRWN 4 Drawing Page(s)
LN.CNT 604
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 15 OF 42 USPATFULL on STN
AB A process for growing single crystal silicon ingots which are substantially free of agglomerated intrinsic point defects. An ingot is grown generally in accordance with the Czochralski method. No portion of the ingot cools to a temperature which is less than a temperature T.sub.A at which agglomeration of intrinsic point defects in the ingot occurs during the time the ingot is being grown. The achievement of defect free ingots is thus substantially decoupled from process parameters, such as pull rate, and system parameters, such as axial temperature gradient in the ingot.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2002:176694 USPATFULL
TI Process for growth of defect free silicon crystals of arbitrarily large diameters
IN Falster, Robert J., London, UNITED KINGDOM
Korb, Harold W., St. Peters, MO, UNITED STATES
PA MEMC Electronic Materials, Inc. (non-U.S. corporation)
PI US 2002092460 A1 20020718
US 6562123 B2 20030513
AI US 2001-35540 A1 20011023 (10)
RLI Continuation of Ser. No. US 1999-344709, filed on 25 Jun 1999, PATENTED
PRAI US 1999-117623P 19990128 (60)
US 1998-104087P 19981014 (60)
US 1998-90723P 19980626 (60)

DT Utility
FS APPLICATION
LREP SENNIGER POWERS LEAVITT AND ROEDEL, ONE METROPOLITAN SQUARE, 16TH FLOOR, ST LOUIS, MO, 63102
CLMN Number of Claims: 4
ECL Exemplary Claim: 1
DRWN 6 Drawing Page(s)
LN.CNT 786
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 16 OF 42 USPATFULL on STN
AB A process for growing single crystal silicon ingots which are substantially free of agglomerated intrinsic point defects. An ingot is grown generally in accordance with the Czochralski method. No portion of the ingot cools to a temperature which is less than a temperature T.sub.A at which agglomeration of intrinsic point defects in the ingot occurs during the time the ingot is being grown. The achievement of defect free ingots is thus substantially decoupled from process parameters, such as pull rate, and system parameters, such as axial temperature gradient in the ingot.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2001:113850 USPATFULL
TI PROCESS FOR GROWTH OF DEFECT FREE SILICON CRYSTALS OF ARBITRARILY LARGE DIAMETERS
IN FALSTER, ROBERT J., MILANO, Italy
KORB, HAROLD W., TOWN AND COUNTRY, MO, United States
PI US 2001008114 A1 20010719
US 6328795 B2 20011211
AI US 1999-344709 A1 19990625 (9)
PRAI US 1998-90723P 19980626 (60)
US 1998-104087P 19981014 (60)
US 1999-117623P 19990128 (60)
DT Utility
FS APPLICATION
LREP SENNIGER POWERS LEAVITT AND ROEDEL, ONE METROPOLITAN SQUARE, 16TH FLOOR, ST LOUIS, MO, 63102
CLMN Number of Claims: 31
ECL Exemplary Claim: 1
DRWN 6 Drawing Page(s)
LN.CNT 918
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 17 OF 42 USPATFULL on STN
AB A **crystal** pulling apparatus is disclosed which employs the **Czochralski** method. The **crystal** pulling apparatus is operated while a containing a crucible of molten material, while maintaining the growing chamber under a controlled pressure of less than atmospheric. In the event of a vacuum pump unexpectedly ceasing operation, power to the heater is terminated, thus allowing the molten material to solidify. In such an event, a second vacuum pump can readily be attached to the growing chamber thus restoring pressure control, and allowing power to the heater to be restored.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2001:102184 USPATFULL
TI Auxillary vacuum apparatus and method for crystal growth
IN Johnson, Aaron W., Vancouver, WA, United States
LaBrie, Aaron L., Vancouver, WA, United States
Spradlin, Randall, Battle Ground, WA, United States
PA SEH America, Inc., Vancouver, WA, United States (U.S. corporation)
PI US 6254673 B1 20010703
AI US 1999-457416 19991207 (9)

DT Utility
FS GRANTED
EXNAM Primary Examiner: Hiteshew, Felisa
LREP Anderson, Douglas G., Courson, Timothy H.
CLMN Number of Claims: 9
ECL Exemplary Claim: 1
DRWN 3 Drawing Figure(s); 2 Drawing Page(s)
LN.CNT 242
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 18 OF 42 USPATFULL on STN
AB With relatively simple arrangement and at low cost, the present invention provides a single crystal pulling apparatus, by which it is possible to prevent a single crystal from being turned to polycrystal, to move the crystal itself smoothly and gently from a necking portion during pulling operation of the single crystal, and to reliably hold the single crystal even in case of trouble such as power suspension. The apparatus comprises a support base 13 as a dish-shaped member to support a portion with larger diameter 30 from below under a seed crystal 21, pulley means 4 for rotating the support base and being movable between a position where the support base does not support the lower end of the portion with larger diameter of the single crystal and a position where it supports the lower end of the portion with larger diameter depending on the rotation angle, pulley rotating means 3a and 3b for rotating the pulley means and moving said support base between said two positions, and pulling lifting means 3a and 3b for moving up said support base by lifting the pulley means while controlling the rate.

AN 2001:55228 USPATFULL
TI Single crystal pull-up apparatus and single crystal pull-up method
IN Shiraishi, Yutaka, Annaka, Japan
PA Super Silicon Crystal Research Institute Corporation, Gunma, Japan (non-U.S. corporation)
PI US 6217648 B1 20010417
WO 9913138 19990318
AI US 1999-284834 19990421 (9)
WO 1998-JP3787 19980826
19990421 PCT 371 date
19990421 PCT 102(e) date
PRAI JP 1997-256153 19970905
DT Utility
FS Granted
EXNAM Primary Examiner: Garrett, Felisa
LREP McDermott, Will & Emery
CLMN Number of Claims: 15
ECL Exemplary Claim: 1
DRWN 11 Drawing Figure(s); 10 Drawing Page(s)
LN.CNT 573

L10 ANSWER 19 OF 42 USPATFULL on STN
AB A method and apparatus for producing silicon single crystals with reduced contamination is disclosed. In one embodiment the structural components constructed of graphite and located in the hot zone of the crystal pulling apparatus have two protective layers. The first protective layer is applied directly to the graphite component. The second protective layer is a silicon layer and is applied on top of the first protective layer and covers the first layer. In a second embodiment, the structural components constructed of graphite and located in the hot zone of the crystal pulling apparatus have a single protective layer. The single protective layer is applied directly to the graphite and consists of a mixture of silicon carbide and silicon.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AN 2001:17801 USPATFULL
TI Process and apparatus for preparation of silicon crystals with reduced metal content
IN Holder, John D., Lake St. Louis, MO, United States
Joslin, Steven M., St. Peters, MO, United States
Korb, Harold W., Town & Country, MO, United States
PA MEMC Electronic Materials, Inc., St. Peters, MO, United States (U.S. corporation)
PI US 6183553 B1 20010206
AI US 1998-97779 19980615 (9)
DT Utility
FS Granted
EXNAM Primary Examiner: Kunemund, Robert
LREP Senniger, Powers, Leavitt & Roedel
CLMN Number of Claims: 28
ECL Exemplary Claim: 1
DRWN 3 Drawing Figure(s); 3 Drawing Page(s)
LN.CNT 544
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 20 OF 42 USPATFULL on STN
AB A crucible is held in a closed position when the crucible is at a certain temperature. A temperature sensitive member expands differently in response to heat than other portions of the crucible. When the temperature of the temperature sensitive member is increased, the temperature sensitive member expands an amount different than do other portions of the crucible and thereby causes the crucible to open.

AN 2001:10385 USPATFULL
TI Crucible with differentially expanding release mechanism
IN Heid, Gary R., Vancouver, WA, United States
PA SEH America, Inc., Vancouver, WA, United States (U.S. corporation)
PI US 6176923 B1 20010123
AI US 1999-432406 19991102 (9)
RLI Division of Ser. No. US 1998-81777, filed on 20 May 1998, now patented, Pat. No. US 6063188
DT Utility
FS Granted
EXNAM Primary Examiner: Garrett, Felisa
LREP Oliff & Berridge, PLC
CLMN Number of Claims: 9
ECL Exemplary Claim: 1
DRWN 18 Drawing Figure(s); 6 Drawing Page(s)
LN.CNT 428

L10 ANSWER 21 OF 42 USPATFULL on STN
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2000:153990 USPATFULL
TI Method of making silicon quantum wires
IN Canham, Leigh-Trevor, Worcestershire, United Kingdom
Keen, John Michael, Worcestershire, United Kingdom
Leong, Weng Yee, Worcestershire, United Kingdom
PA The Secretary of State for Defence in Her Britannic Majesty's Government of the United Kingdom of Great Britain and Northern Ireland, London, United Kingdom (non-U.S. government)
PI US 6147359 20001114
AI US 1992-960694 19921014 (7)
RLI Continuation of Ser. No. US 1992-852208, filed on 4 Jun 1992, now patented, Pat. No. US 5348618 which is a continuation of Ser. No. WO 1990-GB1901, filed on 6 Dec 1990
PRAI GB 1989-27709 19891207
DT Utility
FS Granted

EXNAM Primary Examiner: Monin, Jr., Donald L.
LREP Nixon & Vanderhye P.C.
CLMN Number of Claims: 37
ECL Exemplary Claim: 1
DRWN 8 Drawing Figure(s); 5 Drawing Page(s)
LN.CNT 645
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 22 OF 42 USPATFULL on STN
AB A method and apparatus for growing and manufacturing a single **crystal** according to a so-called **Czochralski** (**CZ**) method. A seed **crystal** 12 is connected to a tip end of a wire 41a as a hanging member 41 to pull and form a single crystal part 15, arm-shaped members 44a of a lifting jig 44 are engaged in a recess 16 of a corrugated portion 14 formed on the single crystal part 15 during the pulling operation, the pulling speeds of both of the arm-shaped members 44a and wire 41a are synchronously controlled to provide smooth transfer between the arm-shaped members 44a and wire 41a, whereby the single crystal part 15 is pulled always at a constant pulling speed. In particular, a heavy-weight single crystal can be safely pulled and formed without any dislocation therein while minimizing an impact force applied to the crystal.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2000:117068 USPATFULL
TI Single crystal growing method and apparatus
IN Iino, Eiichi, Annaka, Japan
Nakamura, Yasushi, Annaka, Japan
Otsuka, Seiichiro, Annaka, Japan
Midzuishi, Koji, Annaka, Japan
Kimura, Masanori, Annaka, Japan
Yamagishi, Hirotoshi, Annaka, Japan
PA Shin-Etsu Handotai Co., Ltd., Tokyo, Japan (non-U.S. corporation)
PI US 6113686 20000905
WO 9633301 19961024
AI US 1998-945209 19980203 (8)
WO 1996-JP1089 19960422
19980203 PCT 371 date
19980203 PCT 102(e) date
PRAI JP 1995-120680 19950421
JP 1995-256892 19950909
DT Utility
FS Granted
EXNAM Primary Examiner: Hiteshew, Felisa
LREP Snider, Ronald R.Snider & Associates
CLMN Number of Claims: 20
ECL Exemplary Claim: 1
DRWN 18 Drawing Figure(s); 11 Drawing Page(s)
LN.CNT 1007
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 23 OF 42 USPATFULL on STN
AB An object of the invention is to provide a single crystal clamping device and a single crystal supporting method. The single crystal clamping device does not become inclined and does not vibrate, and the center of the single crystal clamping device is congruous to the center of the growing single crystal. An apparatus for pulling up single crystals of the present invention, comprises: a single crystal pulling up wire for pulling up a seed crystal immersed in a melt of a raw material; a single crystal clamping device for clamping one end of the single crystal grown beneath the seed crystal; a wire-winding mechanism fixed on the single crystal clamping means and winding up the single crystal pulling up wire so as to adjust a speed of the single-crystal

pulling up wire corresponding to the ascending/descending speeds of the single crystal clamping device; a pulling up wire-load cell for detecting the load applied on the crystal; and a summation load cell for measuring the combined load applied on the crystal pulling up wire and the single crystal clamping device.

AN 2000:101676 USPATFULL
TI Apparatus for pulling up single crystals and single crystal clamping device
IN Kurosaka, Shoei, Kanagawa, Japan
Inagaki, Hiroshi, Kanagawa, Japan
Kawashima, Shigeki, Kanagawa, Japan
Tomioka, Junsuke, Kanagawa, Japan
PA Komatsu Electronic Metals Co., Ltd., Kanagawa, Japan (non-U.S. corporation)
PI US 6099642 20000808
AI US 1998-88657 19980602 (9)
PRAI JP 1997-159210 19970602
DT Utility
FS Granted
EXNAM Primary Examiner: Hiteshew, Felisa C.
LREP Sughrue, Mion, Zinn, Macpeak & Seas, PLLC
CLMN Number of Claims: 13
ECL Exemplary Claim: 1
DRWN 10 Drawing Figure(s); 6 Drawing Page(s)
LN.CNT 671

L10 ANSWER 24 OF 42 USPATFULL on STN
AB A crucible is held in a closed position when the crucible is at a certain temperature. A temperature sensitive member expands differently in response to heat than other portions of the crucible. When the temperature of the temperature sensitive member is increased, the temperature sensitive member expands an amount different than do other portions of the crucible and thereby causes the crucible to open.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2000:61005 USPATFULL
TI Crucible with differentially expanding release mechanism
IN Heid, Gary R., Vancouver, WA, United States
PA Seh-America. Inc., Vancouver, WA, United States (U.S. corporation)
PI US 6063188 20000516
AI US 1998-81777 19980520 (9)
DT Utility
FS Granted
EXNAM Primary Examiner: Hiteshew, Felisa
LREP Oliff & Berridge, PLC
CLMN Number of Claims: 12
ECL Exemplary Claim: 1
DRWN 18 Drawing Figure(s); 6 Drawing Page(s)
LN.CNT 423
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 25 OF 42 USPATFULL on STN
AB There is disclosed a method of manufacturing a silicon monocrystal in accordance with the **Czochralski** method in which a seed **crystal** is brought into contact with silicon melt and is then slowly pulled while being rotated in order to grow a silicon monocrystalline ingot below the seed crystal. In the method, there is used a seed crystal whose a tip end to be brought into contact with the silicon melt has a sharp-pointed shape or a truncation thereof. The tip end of the seed crystal is gently brought into contact with the silicon melt, and the seed crystal is then lowered at a low speed in order to melt the tip end portion of the seed crystal until the thickness of the

tip portion increases to a desired value. Subsequently, the seed crystal is pulled slowly in order to grow a silicon monocrystalline ingot having a desired diameter without performance of a necking operation. During the growth of the silicon monocrystalline ingot, a part of the crystal is mechanically held. The method completely prevents falling of a monocrystalline ingot being grown which would otherwise occur due to the increased diameter and weight of the ingot.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2000:53602 USPATFULL
TI Method of manufacturing a silicon monocrystal, and method of holding the same
IN Iino, Eiichi, Gunma-ken, Japan
PA Shin-Etsu Handotai Co., Ltd., Tokyo, Japan (non-U.S. corporation)
PI US 6056818 20000502
AI US 1998-96093 19980611 (9)
PRAI JP 1997-181720 19970623
DT Utility
FS Granted
EXNAM Primary Examiner: Hiteshen, Felisa
LREP Loeb & Loeb, LLP
CLMN Number of Claims: 3
ECL Exemplary Claim: 1
DRWN 11 Drawing Figure(s); 3 Drawing Page(s)
LN.CNT 453
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 26 OF 42 USPATFULL on STN
AB An apparatus and a method capable of automatically adjusting an initial position of the surface of a melt without an operator are provided. In a single crystal puller using a wire as a suspender for a seed crystal for growing a single **crystal** of silicon or the like according to the **CZ** method, a reference position of the seed **crystal** is detected, the wire is unwound to lower the end of the wire to a position higher by a distance W-X from the reference position and then pulled upward above said reference position to correct the wire for an extension due to the weight of a single crystal attached thereto. Also, the wire is left above a melt for about ten minutes to provide a constant amount of extension to the wire due to heat of the melt. These operations are automatically performed.

AN 2000:1412 USPATFULL
TI Method for adjusting initial position of melt surface
IN Urano, Masahiko, Takasaki, Japan
Ozaki, Atsushi, Annaka, Japan
Kakegawa, Tomohiro, Tomioka, Japan
Nakano, Hideki, Sawa, Japan
PA Shin-Estu Handotai Co., Ltd., Tokyo, Japan (non-U.S. corporation)
PI US 6010568 20000104
AI US 1999-226106 19990107 (9)
RLI Division of Ser. No. US 1996-760963, filed on 5 Dec 1996, now patented, Pat. No. US 5888299
PRAI JP 1995-351274 19951227
DT Utility
FS Granted
EXNAM Primary Examiner: Hiteshew, Felisa C.
LREP Oliff & Berridge, PC
CLMN Number of Claims: 5
ECL Exemplary Claim: 1
DRWN 6 Drawing Figure(s); 4 Drawing Page(s)
LN.CNT 632

L10 ANSWER 27 OF 42 USPATFULL on STN

AB In a crystal holding apparatus, a corrugated portion between a seed crystal and a straight cylindrical portion of a crystal is held by a lifting jig during a single-crystal growing process wherein the seed crystal is brought into contact with a material melt and is subsequently pulled while being rotated. The tip end portion of the lifting jig includes a swinging portion having a short stroke which swings to hold or release the corrugated portion. A lock mechanism is also provided in order to swing the swinging portion for opening/closing operation and to lock the swinging portion. Accordingly, it is possible to reliably hold the corrugated portion of a crystal while the **crystal** is pulled in accordance with the **CZ** method, for example.

AN 1999:64974 USPATFULL
TI Crystal holding apparatus
IN Nakamura, Yasushi, Tomioka, Japan
Otsuka, Seiichiro, Tomioka, Japan
PA Shin-Etsu Handotai Co., Ltd., Tokyo, Japan (non-U.S. corporation)
PI US 5910216 19990608
AI US 1997-916155 19970902 (8)
PRAI JP 1996-267806 19960918
DT Utility
FS Granted
EXNAM Primary Examiner: Hiteshew, Felisa
LREP Oliff & Berridge, PLC
CLMN Number of Claims: 16
ECL Exemplary Claim: 1
DRWN 7 Drawing Figure(s); 5 Drawing Page(s)
LN.CNT 506

L10 ANSWER 28 OF 42 USPATFULL on STN
AB An apparatus and a method capable of automatically adjusting an initial position of the surface of a melt without an operator are provided. In a single crystal puller using a wire as a suspender for a seed crystal for growing a single **crystal** of silicon or the like according to the **CZ** method, a reference position of the seed **crystal** is detected, the wire is unwound to lower the end of the wire to a position higher by a distance W-X from the reference position and then pulled upward above said reference position to correct the wire for an extension due to the weight of a single crystal attached thereto. Also, the wire is left above a melt for about ten minutes to provide a constant amount of extension to the wire due to heat of the melt These operations are automatically performed.

AN 1999:39729 USPATFULL
TI Apparatus for adjusting initial position of melt surface
IN Urano, Masahiko, Takasaki, Japan
Ozaki, Atsushi, Annaka, Japan
Kakegawa, Tomohiro, Tomioka, Japan
Nakano, Hideki, Sawa, Japan
PA Shin-Etsu Handotai Co., Ltd., Tokyo, Japan (non-U.S. corporation)
PI US 5888299 19990330
AI US 1996-760963 19961205 (8)
PRAI JP 1995-351274 19951227
DT Utility
FS Granted
EXNAM Primary Examiner: Hiteshew, Felisa
LREP Oliff & Berridge, PLC
CLMN Number of Claims: 5
ECL Exemplary Claim: 1
DRWN 6 Drawing Figure(s); 4 Drawing Page(s)
LN.CNT 648

L10 ANSWER 29 OF 42 USPATFULL on STN

AB In a crystal holding apparatus, a stepped engagement portion of a single crystal formed below a seed crystal is held by holding portions of a pair of lifting jigs so as to be pulled up. A lock mechanism consisting of a hook lever and an engagement pin is provided in order to prevent the closed lifting jigs from opening. Further, a portion of each holding portion to be contacted with a crystal is provided with a swing claw which is swingable about a horizontal pin. Accordingly, it becomes possible to reliably hold the crystal, to prevent generation of a defect in the crystal structure, and to prevent a material melt from being contaminated.

AN 1998:150255 USPATFULL
TI Crystal holding apparatus
IN Kimura, Masanori, Annaka, Japan
Iino, Eiichi, Annaka, Japan
Yamagishi, Hirotoshi, Annaka, Japan
Takano, Kiyotaka, Annaka, Japan
PA Shin-Etsu Handotai Co., Ltd., Tokyo, Japan (non-U.S. corporation)
PI US 5843229 19981201
AI US 1996-763889 19961211 (8)
PRAI JP 1995-351275 19951227
DT Utility
FS Granted
EXNAM Primary Examiner: Garrett, Felisa
LREP Oliff & Berridge, PLC
CLMN Number of Claims: 18
ECL Exemplary Claim: 1
DRWN 11 Drawing Figure(s); 7 Drawing Page(s)
LN.CNT 653

L10 ANSWER 30 OF 42 USPATFULL on STN
AB The disclosed apparatus weighs a grown crystal that is being pulled from melt thereof. The lower end of a rope of known weight is connected to the crystal, while the upper end of the rope is connected to the drum of a rope-winding unit. The rope-winding unit includes a driver coupled to the drum so as to rotate the drum and wind the rope thereon, and the weight of the rope-winding unit including the drum and driver is known. At least one weight sensor is coupled to the rope-winding unit so as to measure the magnitude of gravity acting on the rope-winding unit. Whereby, the weight of the grown crystal is determined by subtracting the sum of the known weights of the rope and the rope-winding unit from the measured magnitude of the gravity acting on the rope-winding unit.

AN 1998:65611 USPATFULL
TI Apparatus for weighing a grown crystal
IN Morimura, Toshiaki, Tokyo, Japan
Noguchi, Yoshitaka, Tokyo, Japan
Oka, Satoshi, Tokyo, Japan
PA Ohkura Electric Co., Ltd., Tokyo, Japan (non-U.S. corporation)
PI US 5763838 19980609
WO 9630729 19961003
AI US 1996-737412 19961123 (8)
WO 1996-JP632 19960314
19961023 PCT 371 date
19961023 PCT 102(e) date
PRAI JP 1995-68454 19950327
DT Utility
FS Granted
EXNAM Primary Examiner: Gellner, Michael L.; Assistant Examiner: Gibson, Randy W.
LREP Iandiorio & Teska
CLMN Number of Claims: 18
ECL Exemplary Claim: 1

DRWN 23 Drawing Figure(s); 11 Drawing Page(s)
LN.CNT 669

L10 ANSWER 31 OF 42 USPATFULL on STN
AB A hopper is sized and shaped for reception in a crystal pulling apparatus for use in charging semiconductor source material to a crucible of the crystal pulling apparatus. The crystal pulling apparatus includes a pulling chamber, a growth chamber, an isolation valve operable to seal the growth chamber from the pulling chamber, and a crucible in the growth chamber. The hopper includes a bin constructed for containing a quantity of semiconductor source material. The bin has an opening in its bottom for delivery of the semiconductor source material from the bin to the crucible. A stopper constructed for closing the opening to prohibit passage of semiconductor source material from the bin is moved by a stopper actuating mechanism between a closed position and an open position. A connector attached to the hopper is constructed for temporarily mounting the hopper in the crystal pulling apparatus.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 96:10488 USPATFULL
TI Hopper for use in charging semiconductor source material
IN Horvath, Julian, Spartanburg, SC, United States
Jones, Dennis G., Taylors, SC, United States
Polett, Jane E., Spartanburg, SC, United States
PA MEMC Electronic Materials, St. Peters, MO, United States (U.S. corporation)
PI US 5488924 19960206
AI US 1993-163661 19931206 (8)
DT Utility
FS Granted
EXNAM Primary Examiner: Breneman, R. Bruce; Assistant Examiner: Garrett, Felisa
LREP Senniger, Powers, Leavitt & Roedel
CLMN Number of Claims: 7
ECL Exemplary Claim: 1
DRWN 12 Drawing Figure(s); 8 Drawing Page(s)
LN.CNT 512
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 32 OF 42 USPATFULL on STN
AB A dopant (76), such as antimony, is cast around a seed crystal (10) to form a seed-dopant assembly (14) that facilitates doping of a molten semiconductor (36), such as silicon, in a crystal-growing furnace (34). To grow a doped ingot, the seed-dopant assembly is held in a relatively cool part of the furnace while the semiconductor is melted. When the semiconductor melt is ready for doping, the seed-dopant assembly is lowered to a position just above the melt. Heat transferred to the seed dopant assembly from the melt causes the dopant to drop off the seed into the molten semiconductor without splashing and without immersing the seed.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 95:33161 USPATFULL
TI Cast dopant for crystal growing
IN Yemane-Berhane, Mengistu, Beaverton, OR, United States
Colburn, Bruce L., Vancouver, WA, United States
PA Simco/Ramic Corporation, Medford, OR, United States (U.S. corporation)
PI US 5406905 19950418
AI US 1993-69123 19930528 (8)
DT Utility
FS Granted
EXNAM Primary Examiner: Kunemund, Robert

LREP Stoel Rives Boley Jones and Grey
CLMN Number of Claims: 18
ECL Exemplary Claim: 1
DRWN 4 Drawing Figure(s); 2 Drawing Page(s)
LN.CNT 337
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 33 OF 42 USPATFULL on STN
AB A method and an apparatus for measuring oscillation of a melt surface in growing a single **crystal** by **Czochralski** process, particularly in growing and pulling a **crystal** neck portion having a small diameter of 2 to 5 mm. The image of a region where the single **crystal** is being grown by the **Czochralski** process is taken by a camera 38 and the outside diameter D.sub.o of a bright ring image 70 of a brightness not lower than a predetermined reference value E is detected in accordance with video signals produced by the camera (Steps 80-83). The amount of oscillation of the outside diameter D.sub.o is measured as the amount S.sub.v of oscillation of the melt surface near the region where the single crystal is grown. The reference value E is determined by multiplying the maximum value of the video signals in one field with a predetermined constant K. The constant K is a value which, when the velocity of pulling of the single crystal is fixed to zero, substantially maximizes the amount of S.sub.v of oscillation of the outside diameter D.sub.o.

AN 92:101215 USPATFULL
TI Method of and apparatus for measuring oscillation of the outside diameter of a melt surface
IN Baba, Masahiko, Annaka, Japan
PA Shin-Etsu Handotai Company, Limited, Tokyo, Japan (non-U.S. corporation)
PI US 5170061 19921208
AI US 1991-693171 19910429 (7)
PRAI JP 1990-113289 19900429
DT Utility
FS Granted
EXNAM Primary Examiner: Nelms, David C.; Assistant Examiner: Le, Que T.
LREP Browdy and Neimark
CLMN Number of Claims: 18
ECL Exemplary Claim: 1
DRWN 12 Drawing Figure(s); 8 Drawing Page(s)
LN.CNT 515

L10 ANSWER 34 OF 42 USPATFULL on STN
AB A single crystal pulling apparatus having a wire which is used to pull a crystal is provided with a novel wire vibration prevention mechanism. The wire vibration prevention mechanism includes wire restriction devices which restrict the movement of the wire to movement in the vertical direction. The wire restriction devices may be mechanically driven in the horizontal direction in order to center the pulled crystal. The wire restriction devices are driven by pneumatic air cylinders. Use of the wire vibration prevention mechanism avoids the formation of deformed growth of the pulled crystal and thus reduces the occurrence of dislocations in the pulled crystal.

AN 92:12699 USPATFULL
TI Wire vibration prevention mechanism for a single crystal pulling apparatus
IN Mizuishi, Koji, Annaka, Japan
Harada, Isamu, Annaka, Japan
Nakamura, Yasushi, Tomioka, Japan
Oda, Michiaki, Annaka, Japan
Ohtsuka, Seiichiro, Tomioka, Japan
Hirano, Yoshihiro, Annaka, Japan

Urano, Masahiko, Takasaki, Japan
PA Shin-Etsu Handotai Company Limited, Tokyo, Japan (non-U.S. corporation)
PI US 5089239 19920218
AI US 1990-509846 19900417 (7)
PRAI JP 1989-96304 19890418
JP 1989-U48205 19890426
DT Utility
FS Granted
EXNAM Primary Examiner: Chaudhuri, Olik; Assistant Examiner: Garrett, Felisa
LREP Lowe, Price, LeBlanc & Becker
CLMN Number of Claims: 3
ECL Exemplary Claim: 1
DRWN 14 Drawing Figure(s); 6 Drawing Page(s)
LN.CNT 527

L10 ANSWER 35 OF 42 USPATFULL on STN
AB A device for measuring offset of the axis of a single crystal lifting wire with respect to the axis of rotation of a crucible rotary shaft in a single **crystal** production apparatus based upon **Czochralski** method. The apparatus comprises a base plate (16, 16A, 16B) mounted on a table (12) fixed to the upper end of the crucible rotary shaft (10), a weight suspended from the wire (34) and having a stylus projected downward from the lower end thereof or capable of downwardly emitting a laser beam (36C), a device mounted on the base plate and capable of optically detecting the position of said stylus or said laser beam, and a device for displaying the detected position.

AN 91:44218 USPATFULL
TI Axis offset measuring device
IN Ibe, Hiroyuki, Nyu, Japan
PA Shin-Etsu Handotai Company, Limited, Tokyo, Japan (non-U.S. corporation)
PI US 5020907 19910604
AI US 1989-427428 19891027 (7)
PRAI JP 1988-273942 19881028
DT Utility
FS Granted
EXNAM Primary Examiner: Rosenberger, Richard A.
LREP Browdy and Neimark
CLMN Number of Claims: 6
ECL Exemplary Claim: 1
DRWN 3 Drawing Figure(s); 3 Drawing Page(s)
LN.CNT 320

L10 ANSWER 36 OF 42 USPATFULL on STN
AB A crystal growth apparatus (10) having a heated spherical growth container (12) is filled with a crystalline material in solid or liquid form. The crystalline material is heated by resistance heating wire (58) to a predetermined temperature, whereupon the application of heat to the crystalline material is reduced and the accumulated heat is drawn off and dissipated by a seed crystal (76) attached to a rod (70) of heat conductive material, which in turn is attached to a heat dissipating member (72). This results in the formation of a single, defect-free crystal on seed crystal (76), which grows outward in a generally spherical configuration as more heat is removed.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 88:24275 USPATFULL
TI Method and apparatus for growing crystals
IN Naumann, Robert J., Huntsville, AL, United States
Lehoczky, Sandor L., Huntsville, AL, United States
Frazier, Donald O., Huntsville, AL, United States
PA The United States of America as represented by the Administrator of the National Aeronautics & Space Administration, Washington, DC, United

States (U.S. government)
PI US 4738831 19880419
AI US 1986-925189 19861031 (6)
DT Utility
FS Granted
EXNAM Primary Examiner: Pal, Asok
LREP Beumer, Joseph H.
CLMN Number of Claims: 7
ECL Exemplary Claim: 1
DRWN 5 Drawing Figure(s); 5 Drawing Page(s)
LN.CNT 389
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 37 OF 42 USPATFULL on STN
AB Apparatus for the closed-loop controlled growth of **crystalline** material by the **Czochralski** technique includes means for establishing a melt of a given crystallisable material, means for pulling a crystal from said melt when established, said means for pulling incorporating a rigid elongated pulling member defining a crystal pulling axis, means for rotating said pulling member about said crystal pulling axis and a weighing cell located at the end of said pulling member distant from said means for establishing a melt and capable of providing, for the purpose of closed-loop control of said crystal pulled, a signal related to the force along said crystal pulling axis on the pulling member.

The weighing cell is preferably one of the kind having a spring and a transducer arranged to produce an electrical output related to the tension of the spring. The pulling member is preferably freely suspended from the weighing cell by a coupling which allows the pulling member to be rotated without rotating the weighing cell.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 76:4739 USPATFULL
TI Weighing cell apparatus for diameter control of a rotatable growing crystal
IN Bardsley, William, West Malvern, England
Green, Geoffrey William, Malvern, England
Holliday, Charles Harry, Newland, England
Hurle, Donald Thomas James, Welland, England
PA National Research Development Corporation, London, England (non-U.S. corporation)
PI US 3934983 19760127
AI US 1973-395172 19730907 (5)
PRAI GB 1972-41726 19720908
DT Utility
FS Granted
EXNAM Primary Examiner: Yudkoff, Norman; Assistant Examiner: Sever, Frank
LREP Cushman, Darby & Cushman
CLMN Number of Claims: 4
ECL Exemplary Claim: 1
DRWN 5 Drawing Figure(s); 4 Drawing Page(s)
LN.CNT 586
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 38 OF 42 USPAT2 on STN
AB In the **CZ** process using a cooling member surrounding a single **crystal**, the cooling member is permitted to effectively serve to increase a pulling speed. Cracks of the single crystal due to excessive cooling are prevented to occur. A high crystal quality is acquired. In order to realize these objects, the temperature of the inner peripheral surface of the cooling member 6 opposing to the outer peripheral surface of the single crystal 4 is restricted to 500° C. or below, even

in the lower end, the temperature of which becomes the highest. To achieve this restriction, the thickness T of the cooling member 5 is 10 to 50 mm. The height H of the cooling member 6 is 0.1 to 1.5 times the diameter D of the single crystal 4.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2003:217098 USPAT2
TI Crystal growth method
IN Kubo, Takayuki, Tokyo, JAPAN
Kawahigashi, Fumio, Tokyo, JAPAN
Asano, Hiroshi, Tokyo, JAPAN
Miki, Shinichiro, Tokyo, JAPAN
Nishimoto, Manabu, Tokyo, JAPAN
PA Sumitomo Mitsubishi Silicon Corporation, Tokyo, JAPAN (non-U.S. corporation)
PI US 6767400 B2 20040727
WO 2002027079 20020404
AI US 2002-130671 20020924 (10)
WO 2001-JP8313 20010925
DT Utility
FS GRANTED
EXNAM Primary Examiner: Hiteshew, Felisa
LREP Morrison & Foerster LLP
CLMN Number of Claims: 5
ECL Exemplary Claim: 1
DRWN 1 Drawing Figure(s); 1 Drawing Page(s)
LN.CNT 390
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 39 OF 42 USPAT2 on STN
AB The present invention provides an apparatus and a method for producing a silicon semiconductor single crystal which can stabilize and homogenize an amount of precipitated oxygen in the direction of the crystal growth axis when growing a silicon semiconductor single crystal. The apparatus for producing a silicon semiconductor single **crystal** by the **Czochralski** method comprises a main growth furnace having a crucible retaining silicon melt disposed therein for growing a silicon semiconductor single crystal, and an upper growth furnace for housing therein and cooling the silicon semiconductor single crystal pulled from the silicon melt, wherein the upper growth furnace communicated to a ceiling section of the main growth furnace is provided with an upper insulating member for surrounding a pulled silicon semiconductor single crystal.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2003:131227 USPAT2
TI Apparatus and method for producing silicon semiconductor single crystal
IN Hoshi, Ryoji, Fukushima, JAPAN
Yanagimachi, Takahiro, Fukushima, JAPAN
Fusegawa, Izumi, Fukushima, JAPAN
Ohta, Tomohiko, Fukshima, JAPAN
Miyahara, Yuuichi, Takefu, JAPAN
Igarashi, Tetsuya, Takefu, JAPAN
PA Shin-Etsu Handotai Co., Ltd., Tokyo, JAPAN (non-U.S. corporation)
PI US 6764548 B2 20040720
WO 2002036861 20020510
AI US 2002-204278 20020820 (10)
WO 2001-JP9434 20011026
PRAI JP 2000-333747 20001031
DT Utility
FS GRANTED
EXNAM Primary Examiner: Hiteshew, Felisa
LREP Rader, Fishman & Grauer PLLC

CLMN Number of Claims: 29
ECL Exemplary Claim: 1
DRWN 6 Drawing Figure(s); 6 Drawing Page(s)
LN.CNT 882
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 40 OF 42 USPAT2 on STN
AB In a method manufacturing a silicon single crystal 8 according to an MCZ method, a flow rate of an inert gas flowing in a growth furnace 1 during growth of the silicon single crystal 8 and/or a pressure in the growth furnace 1 is altered according to a pulling amount of the silicon single crystal 8 to adjust an interstitial oxygen concentration therein. By altering a flow rate of an inert gas flowing in the growth furnace or a pressure therein, an amount of oxygen evaporating as an oxide from a surface of a silicon melt 10 in the vicinity of a crystal growth interface can be easily adjusted, and thereby, an oxygen amount included in the silicon melt 10 can be controlled with ease.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2002:284779 USPAT2
TI Method for preparing silicon single crystal and silicon single crystal
IN Fusegawa, Izumi, Fukushima, JAPAN
Hoshi, Ryoji, Fukushima, JAPAN
Inokoshi, Kouichi, Fukushima, JAPAN
Ohta, Tomohiko, Fukushima, JAPAN
PA Shin-Etsu Handotai Co., Ltd., Tokyo, JAPAN (non-U.S. corporation)
PI US 6592662 B2 20030715
WO 2001063027 20010830
AI US 2001-959381 20011024 (9)
WO 2001-JP1460 20010227
PRAI JP 2000-52540 20000228
DT Utility
FS GRANTED
EXNAM Primary Examiner: Hiteshew, Felisa
LREP Snider & Associates, Snider, Ronald R.
CLMN Number of Claims: 17
ECL Exemplary Claim: 1
DRWN 6 Drawing Figure(s); 6 Drawing Page(s)
LN.CNT 919
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 41 OF 42 USPAT2 on STN
AB A process for growing single crystal silicon ingots of which portions are substantially free of agglomerated intrinsic point defects. An ingot is grown generally in accordance with the Czochralski method. A first portion of the ingot cools to a temperature which is less than a temperature T.sub.A at which agglomeration of intrinsic point defects in the ingot occurs during the time the ingot is being grown, while a second portion remains at a temperature above T.sub.A. The second portion of the ingot is subsequently maintained at a temperature above T.sub.A to produce a portion which is substantially free of agglomerated intrinsic point defects.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2002:176694 USPAT2
TI Process for growing defect-free silicon wherein the grown silicon is cooled in a separate chamber
IN Falster, Robert J., London, UNITED KINGDOM
Korb, Harold W., Town & Country, MO, United States
PA MEMC Electronic Materials, Inc., St. Peters, MO, United States (U.S. corporation)
PI US 6562123 B2 20030513
AI US 2001-35540 20011023 (10)

RLI Continuation of Ser. No. US 1999-344709, filed on 25 Jun 1999, now patented, Pat. No. US 6328795, issued on 11 Dec 2001
PRAI US 1998-90723P 19980626 (60)
US 1998-104087P 19981014 (60)
US 1999-117623P 19990128 (60)
DT Utility
FS GRANTED
EXNAM Primary Examiner: Utech, Benjamin L.; Assistant Examiner: Tran, Binh X.
LREP Senniger, Powers, Leavitt & Roedel
CLMN Number of Claims: 15
ECL Exemplary Claim: 1
DRWN 8 Drawing Figure(s); 6 Drawing Page(s)
LN.CNT 975
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L10 ANSWER 42 OF 42 USPAT2 on STN
AB A process for growing single crystal silicon ingots which are substantially free of agglomerated intrinsic point defects. An ingot is grown generally in accordance with the Czochralski method. No portion of the ingot cools to a temperature which is less than a temperature T.sub.A at which agglomeration of intrinsic point defects in the ingot occurs during the time the ingot is being grown. The achievement of defect free ingots is thus substantially decoupled from process parameters, such as pull rate, and system parameters, such as axial temperature gradient in the ingot.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AN 2001:113850 USPAT2
TI Process for growth of defect free silicon crystals of arbitrarily large diameters
IN Falster, Robert J., Milan, Italy
Korb, Harold W., Town & Country, MO, United States
PA MEMC Electronic Materials, Inc., St. Peters, MO, United States (U.S. corporation)
PI US 6328795 B2 20011211
AI US 1999-344709 19990625 (9)
PRAI US 1999-117623P 19990128 (60)
US 1998-104087P 19981014 (60)
US 1998-90723P 19980626 (60)
DT Utility
FS GRANTED
EXNAM Primary Examiner: Kunemund, Robert; Assistant Examiner: Tran, Binh X.
LREP Senniger, Powers, Leavitt & Roedel
CLMN Number of Claims: 31
ECL Exemplary Claim: 1
DRWN 8 Drawing Figure(s); 6 Drawing Page(s)
LN.CNT 1006
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

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5,582,642
5,089,239

10/676,274 Examiner's Notes
S (Cz or czochralski) (8w) (crystal?) (dampen?)
S (mechanic?) (8w) (dampen?)
~~S (dampen?)~~
S (interrupt? or intercept? or stop? or slow?) (8w) (wire or pull? (w) wire)
S (pendular (w) motion or motion)
S (controller)
S (vibration) (8w) (alter? or adjust? or vary?
S (stop? or interrupt? or intercept? or dampen? or slow?) (8w) (orbit?)

103 Rej
Claims 1-5; 8, 9 and 12

Allowable Subject matter
Objected to
Claims 6, 7, 10 & 11